# PATENT ABSTRACTS OF JAPAN

(11)Publication number : **07-134120**
(43)Date of publication of application : **23.05.1995**

(51)Int.Cl. **G01N 30/06**
**G01N 27/26**
**G01N 30/02**
**G01N 30/14**

(21)Application number : **05-282801**
(22)Date of filing : **11.11.1993**

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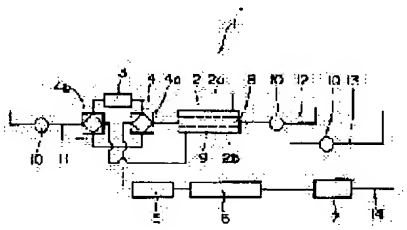
## (54) NEUTRALIZATION, ION CHROMATOGRAPHIC ANALYSIS, NEUTRALIZATION APPARATUS AND ION CHROMATOGRAPHIC APPARATUS

(57)Abstract:
PURPOSE: To provide an ion neutralizing method and apparatus which can neu tralize an acidic solution without preparing an alkaline solution and provide an ion chromatographic analysis method and apparatus which can analyse metal ions in an acidic solution without preparing an alkaline solution.
CONSTITUTION: In a neutralizing method, an acidic solution is neutralized with OH- through an anion exchange membrane wherein OH- is produced by electrolysis. A neutralizing apparatus 2 for the neutralizing method is composed of a first space part 8 containing an acidic solution, a second space part 9 provided with an anode and a cathode to produce OH- by electrolysis, and an anion exchange membrane through which neutralization reaction of the acidic solution in the first space part 8 and OH- produced in the second space part 9 can be carried out. The neutralizing method and the neutralizing apparatus are utilized for ion chromatographic analysis and an ion chromatographic analysis apparatus. Consequently, the neutralization of the acidic solution utterly dispenses with the preparation of an alkaline solution.



LEGAL STATUS

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|---|---|
| [Date of request for examination] | 30.03.1999 |
| [Date of sending the examiner's decision of rejection] | |
| [Kind of final disposal of application other than the examiner's decision of rejection or application converted registration] | |
| [Date of final disposal for application] | |
| [Patent number] | 3307739 |
| [Date of registration] | 17.05.2002 |
| [Number of appeal against examiner's decision of rejection] | |
| [Date of requesting appeal against examiner's decision of rejection] | |
| [Date of extinction of right] | |

* NOTICES *



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2.**** shows the word which can not be translated.
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## EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, it is OH required for neutralization of an acidic solution. - Since it forms by electrolysis, the activity which dissolves alkali matter like before and prepares an alkali solution completely becomes unnecessary, and the risk on the activity which accompanies such a preparation activity is also canceled. Moreover, OH required for neutralization of an acidic solution - Concentration is OH required only by performing adjustment of the potential impressed to an anode plate and cathode, and the amount of currents, since it is easily calculable from the electrochemical theory therefore. - The liquid which has concentration can be prepared easily. Moreover, it is cancelable all un-arranging in the neutralization processing or ion chromatographic analysis by the inaccuracy thru/or the error of alkali matter weighing capacity like [ at the time of dissolving the alkali matter and preparing an alkali solution ].

[Translation done.]

MEANS

[Means for Solving the Problem] Invention given in this application claim 1 for solving said technical problem is OH generated by electrolysis. - It is the neutralization art which separates anion exchange membrane and neutralizes an acidic solution. It is the ion chromatographic-analysis method characterized by invention according to claim 2 pretreating an acidic solution by said neutralization art according to claim 1. Invention according to claim 3 The 1st space section which has an acidic solution, and OH - The 2nd space section which comes to have the anode plate and cathode which are generated by electrolysis, OH generated in the acidic solution of the 1st space section, and the 2nd space section - It is the neutralization processor characterized by coming to have the anion exchange membrane which can be counteracted. Invention according to claim 4 It is the neutralization processor characterized by coming to have ultrasonic irradiation equipment which irradiates a supersonic wave towards the anode plate and cathode of said 2nd space section. Invention according to claim 5 It is ion chromatograph equipment characterized by coming to have said neutralization processor according to claim 3 or 4. Invention according to claim 6 Said neutralization processor according to claim 3 or 4 and the concentration column which condenses the metal ion in the processing liquid which neutralization processing was carried out and was obtained with this neutralization processor, The path and eluate which send into the 2nd space section in said neutralization processor the effluent liquor discharged from said concentration column are sent into said concentration column. It is ion chromatography FURAFU equipment which carries out the description bet of coming to have the path change means which changes an eluate to the path sent into an ion chromatographic column with the metal ion in a concentration column.

[Translation done.]

## DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to a neutralization art, an ion chromatographic-analysis method, a neutralization processor, and ion chromatography FURAFU equipment.
[0002]
[Description of the Prior Art] When analyzing transition metals in a sample solution, such as Fe, nickel, and Co, using an ion chromatographic-analysis method, Fe, nickel, Co, etc. as the metal or metallic compounds of insolubility in a sample solution need pretreatment dissolved from an acid. If this pretreatment is performed, the sample solution will become acidity, if that **** ion chromatographic analysis is performed, in response to the effect of an acid, the holding power of a separation column will become weaker, and the form of the holding time, sensibility, and a peak etc. will change. Consequently, an analytic precision falls. Moreover, analysis depending on an ion kind may be impossible.
[0003] Again Although it is necessary to condense the metal of ultralow volume using the column of ion exchange resin, and to present analysis with this when it is going to analyze a metal ion to the order of ppb, by the acid sample, active jamming of an acid cannot be received, and a metal ion cannot be held and condensed in a concentration column, therefore it cannot analyze.
[0004] About such an acid sample, the following neutralization pretreatments are performed conventionally.
[0005] (1) Neutralize using an OH form anion exchange resin.
[0006] (2) Add silver carbonate and neutralize.
[0007] However, (1) Since the alkali used for playback tends to remain at the same time it is necessary to repeat playback of ion exchange resin frequently in a neutralization process, there is no dependability in analysis precision. Moreover, (2) A neutralization process is restricted when it dissolves with a hydrochloric acid. Moreover, since the impurity of the sample to add mixes, analysis of a minute amount cation cannot be performed. While said two-way-type method has complicated actuation and furthermore takes time and effort, possibility that a sample will be polluted during actuation is also large.
[0008] Analysis of the minor constituent in the charge of trial - which is acidity is difficult by having dissolved from the acid the sample or the insoluble metallic compounds which is acidity from the first for these problems.
[0009] In order to cancel said trouble, an ion chromatography FURAFU analysis method and equipment new at JP,3-125967,A are proposed. Although the analysis method indicated by this open official report is the analytical method which was very excellent, the alkali solution is used for neutralizing an acid data solution. When invention-in-this-application persons inquired further, it was new, and it was very complicated to have prepared an alkali solution, although outstanding analytical method indicated by said official report is enforced, and when preparing an alkali solution moreover, it discovered that there was a new trouble of forcing it remarkable risk-bearing to an operator.
[0010] This invention aims at canceling the above mentioned various troubles at once.
[0011]
[Means for Solving the Problem] Invention of a publication to this application claim 1 for solving said technical problem OH generated by electrolysis - It is the neutralization art which separates anion exchange membrane and neutralizes an acidic solution. Invention according to claim 2 It is the ion chromatographic-analysis method characterized by pretreating an acidic solution by said neutralization art according to claim 1. Invention according to claim 3 The 1st space section which has an acidic solution, and OH - The 2nd space section which comes to have the anode plate and cathode which are generated by electrolysis, OH generated in the acidic solution of the 1st space section, and the 2nd space section - It is the neutralization processor characterized by coming to have the anion exchange membrane which can be counteracted. Invention according to claim 4 It is the neutralization processor characterized by coming to have ultrasonic irradiation equipment which irradiates a supersonic wave towards the anode plate and cathode of said 2nd space section. Invention according to claim 5 It is ion chromatograph equipment characterized by coming to have said neutralization processor according to claim 3 or 4. Invention according to claim 6 Said neutralization processor according to claim 3 or 4 and the concentration column which condenses the metal ion in the processing liquid which neutralization processing was carried out and was obtained with this neutralization processor, The path and eluate which send into the 2nd space section in said neutralization processor the effluent liquor discharged from said concentration column are sent into said concentration column. It is ion chromatography FURAFU equipment which carries out the description bet of coming to have the path change means which changes an eluate to the path sent into an ion chromatographic column with the metal ion in a concentration column.
[0012]
[Example] The concrete contents of this invention are explained below.
[0013] The anion exchange membrane used for this invention is mainly the solid film and film which has the radical of ionicity on the synthetic macromolecule film, and is film which has the radical from which the radical of ionicity serves as a cation like the 4th class ammonium. Therefore, anion exchange membrane can make an anion penetrate alternatively.

[0014] OH generated by electrolysis which has penetrated anion exchange membrane also in any of the approach of this invention, i.e., a neutralization art, and an ion chromatographic-analysis method - An acidic solution is neutralized.
[0015] Said acidic solution is metal cation Mn+ which is the solution which dissolved the metal or metallic compounds of insolubility from the acid, and is a candidate for analysis in order to present cation chromatographic analysis, and H+. And residue X of an acid - Ion is contained.
[0016] Although any of an inorganic acid and an organic acid are sufficient as an acid, an inorganic acid is desirable and a hydrochloric acid, a nitric acid, a sulfuric acid, etc. are used suitably. in this case, X<SUP>- ****** -- Cl-, NO3-, and SO42- etc. -- ion is contained.
[0017] Moreover, an important thing is OH for neutralizing said acidic solution by this invention. - It is the ion generated by electrolysis. They are a lot of OH(s) to underwater [ that ] by impressing a direct current to the anode plate and cathode which were immersed underwater, for example in this invention. - It is made to generate. When this electrolysis is performed, the decomposition effectiveness in an electrode may fall remarkably with the hydrogen gas and oxygen gas which occur in coincidence.
[0018] It sets to the neutralization processor of this invention, and ion chromatography FURAFU equipment, and is OH by electrolysis. - It is desirable to irradiate a supersonic wave towards the electrode for making it generate. By turning a supersonic wave to an electrode and irradiating it, the minute hydrogen gas film and oxygen gas film adhering to an electrode can be destroyed, and the film by the minute air bubbles of hydrogen gas and oxygen gas can prevent being formed in an electrode surface effectively.
[0019] OH generated by electrolysis - Since anion exchange membrane makes only an anion penetrate when said sample solution is contacted through anion exchange membrane, in an acidic solution OH generated by electrolysis - H+ in an acidic solution OH which it reacted, and H2 O was formed and was generated by electrolysis - X which has permeated through anion exchange membrane in the liquid side to contain - Ion and H+ It reacts and HX is formed. In addition, it is X here. - It has the semantics same with having mentioned above.

$$X^- + H^+ \rightarrow H^+ + OH^- \quad (H_2O)$$

[0020] That is, it is with an acidic solution.

(**) Mn++nX - OH generated by eternal electrolysis with coexistence - H++OH-->H++X-(**) alkali-metal ion does not exist with the liquid which it has.
** -- it is expressed like. That is, neutralization of an acid and alkali will be substantially performed through anion exchange membrane.
[0021] The situation is shown in drawing 1 . It is OH which generated I by anion exchange membrane and generated E by electrolysis in drawing 1 . - The liquid (passage) and S which it has are an acidic solution (passage). Although drawing 1 showed the case (arrow head) where E and a S car solution were counterflows, even if it makes both solutions concurrent, it is completely the same. In addition, it cannot be overemphasized that the driving force of migration of the anion in the film is the concentration difference of each anion.
[0022] Industrially, the anion exchange membrane used here is various, and is used for the purpose of ion separation, such as concentration, demineralization, an electrolysis diaphragm, or dialysis, and a commercial item can be used for it.
[0023] Commercial anion exchange membrane has the heterogeneity film and homogeneous membrane, the heterogeneity film mixes the powder of anion exchange resin with the resin which does not have the radical of ionization nature, and fabricates it in the shape of film, homogeneous membrane consists of an anion-exchange radical combined with the macromolecule object which constitutes a film parent, and it, and each can use it for this invention. Reinforcement and an alkali-proof field to homogeneous membrane is desirable.
[0024] As a giant-molecule object which constitutes the parent of homogeneous membrane, there are a styrene-divinylbenzene system of a bridge formation mold, a styrene-butadiene system a styrene-divinylbenzene-polyvinyl chloride system, etc. and a perfluorocarbon system of the mold (line) non-constructing a bridge, and each can be used for this invention. Especially the film of a perfluorocarbon system is chemical-resistant film developed as an object for brine electrolysis, and is suitable also for this invention.
[0025] The anion-exchange radical combined with said macromolecule object is a strong base nature machine of the first class of weak base nature, the second class, the third class amino group, and a quaternary ammonium base and a quaternary pyridinium salt radical, and can be chosen as this invention at arbitration. Many of commercial items are the strong base nature anion exchange membrane of a quaternary ammonium base, and it is desirable to use this.
[0026] Moreover, what compounded the reticulated moldings of a macromolecule system as reinforcing materials is marketed by ion exchange membrane, and reinforcement mold anion exchange membrane can also be used.
[0027] As commercial anion exchange membrane used for this invention "SEREMIONE (trademark)" [the Asahi Glass Co., Ltd. make], "ASHIPU REXX E (trademark)" [the Asahi Chemical Co., Ltd. make] "Neosepta E (trademark)" [the Tokuyama Soda Co., Ltd. make], "the AIO nak ME (trademark)" [U.S. SAIBURON and chemical company make], "NEPUTON ER (trademark)" [the U.S. eye onyx company make], "the EMF-ion E (trademark) etc." [the product made from U.S. EMF], etc. are mentioned.
[0028] As a use gestalt of anion exchange membrane, there are a flat film, a tube, a hollow fiber, etc. and each can be used for this invention. It is efficient to arrange in parallel two or more anion exchange membrane in a filter press mold by the flat film method, although one sheet is sufficient, and to pour an acidic solution S and the alkali solution E by turns like drawing 2 . As for anion exchange membrane and S, in drawing 2 , I is [ an alkali solution and W of an acidic solution and E ] container walls like drawing 1 . Although one is sufficient also as the case of a tube method, the effectiveness of neutralization is good when the hollow filament formed by anion exchange membrane is made into a bundle as shown in drawing 3 , and this hollow filament bundle is used as a dialyzer mold like the so-called diamond riser which it comes to hold in a cylindrical case. In drawing 3 , I, S, and E have the semantics same in drawing 1 and drawing 2 . However, I is the bundle of the hollow filament formed by anion exchange

membrane. An alkali solution is E1. It enters, flows in contact with the outside of the tube of anion exchange membrane, and is E2. It is discharged. The Z-twist close of drawing flows the inside of the tube of anion exchange membrane, and is discharged on the right, and an acidic solution S goes into the column for chromatography.
[0029] Although an acidic solution S and the alkali solution E are counterflows at drawing 2 and drawing 3 , even if it is concurrent, there is no inconvenience, and it can be chosen and used for arbitration. Although an acidic solution S may be poured on the outside of a hollow filament and the alkali solution E may be poured inside a hollow filament in the diamond riser method of drawing 3 , as shown in drawing 3 from the purpose of a neutralization device, it is still more desirable to circulate an acidic solution S inside a hollow filament, and to circulate an acidic solution S on the outside of a hollow filament.
[0030] OH which fabricated anion exchange membrane in the container of the shape of saccate or a bottle, put in the acidic solution into this as the neutralization approach of further others of the acidic solution using anion exchange membrane, and was generated by electrolysis like drawing 4 - The approach immersed in the passage of the liquid to contain is also applicable. This approach serves as a batch type. In Fig. 4, I, S, and E have the same semantics as drawing 1 - drawing 3 , and P is a pipe wall which pours the alkali solution E.
[0031] OH generated by electrolysis in this invention - The contact through anion exchange membrane with an acidic solution (1) OH generated by the 1st space section which has an acidic solution, and electrolysis - The 2nd space section which it has is isolated by anion exchange membrane, (2) The acidic solution which pulled out the acidic solution with the conduit and was pulled out from the 1st space section which has an acidic solution, and OH generated by electrolysis - The 2nd space section which it has is isolated by anion exchange membrane, (3) OH generated by the 1st space section which has an acidic solution, and electrolysis - From the 2nd space section which it has to OH - A conduit draws out the liquid to contain. Pulled-out OH - The liquid to contain is isolated by anion exchange membrane, (4) A conduit draws out an acidic solution from the 1st space section which has an acidic solution. The pulled-out acidic solution and OH generated by electrolysis - From the 2nd space section which it has to OH - OH which pulled out the liquid to contain with the conduit and was pulled out - The liquid to contain is realizable by being isolated by anion exchange membrane etc.
[0032] If the anode plate and cathode which are used for electrolysis are the format of contacting the liquid of the 2nd space circles, they can adopt various configurations, a gestalt, form, magnitude, etc. as arbitration. for example, the liquid with which an anode plate and cathode exist in the 2nd space circles -- you may be the cylinder immersed underwater preferably, tabular, a coiled form, etc., and a suitable gap is established for two or more tabular anode plates and two or more tabular cathode in the 2nd space circles, you may make it arrange by turns, and wall itself which forms the 2nd space section itself may be formed in an anode plate and cathode.
[0033] In the neutralization approach of the acid sample using the anion exchange membrane explained above, or the ion chromatographic-analysis approach using the neutralization approach, 0.01-5 Ns of concentration of the acid used are usually 0.01-0.5N preferably, and 0.01-5 Ns of concentration of the alkali solution used for neutralization are 0.01-0.5N preferably similarly. Moreover, when based on a circulation method, the rate of both the solutions that flow the neutralization equipment which uses anion exchange membrane can be chosen so that it may become a proper flow rate in consideration of the method adopted [ tube / of the anion exchange membrane to be used / a class a flat film, or a tube ], a membranous area, solution concentration, etc. Moreover, the approach of this invention can also be enforced with a batch method, without adopting a circulation method.
[0034] In this invention, the sample solution which is the above, and was made and neutralized is poured into ion chromatographic-analysis equipment in the condition that there is no failure ion mixed on the way.
[0035] As said ion chromatographic-analysis equipment, commercial well-known ion chromatographic-analysis equipment can be used.
[0036] Next, the ion chromatograph equipment using the neutralization art which neutralizes an acidic solution using said anion exchange membrane which is one example of this invention is explained. This ion chromatograph equipment is also equipment which comes to incorporate the neutralization processor which is one example of this invention, and carries out one example of the neutralization art of this invention, and an ion chromatographic-analysis method.
[0037] As shown in drawing 5 , it is the top view showing the outline of the ion chromatograph equipment which is one example of this invention.
[0038] Chromatograph equipment 1 has the neutralization processor 2, the concentration column 3, the path change means 4, the guard column 5, the separation column 6, and a detector 7.
[0039] The neutralization processor 2 comes to have tube-like object 2a of the anion exchange membrane arranged so that edge opening of a tubed case may turn into opening, and the anode plate and negative plate which have been arranged near the inner skin of said tubed case into the tubed case which equips both ends with opening and comes to prepare liquid derivation opening for the end side of a peripheral surface at the liquid inlet and other end side of a peripheral surface, and its tubed case. In this neutralization processor 2, an acidic solution is introduced inside said tube-like object 2a from end opening of tubed case 2b, and from the interior of tube-like object 2a, the liquid after neutralizing outside flows out of other end opening of said tubed case 2b, and it goes. In this neutralization processor 2, the space in tube-like object 2a made from anion exchange membrane becomes the 1st space section 8, and the space formed by said tube-like object 2a and the inside of tubed case 2b becomes the 2nd space section 9. Although not illustrated in this neutralization processor 2 at drawing 5 , it is also desirable to form the ultrasonic vibration generator system which irradiates a supersonic wave in the anode plate and cathode which were prepared in the neutralization processor 2. By irradiating a supersonic wave in cathode and an anode plate, the hydrogen gas and oxygen gas which occur with these electrodes can be removed from an electrode surface, and the effectiveness of electrolysis can be highly maintained over a long time.
[0040] The concentration column 3 is a column which makes high metal ion concentration in the liquid containing the metal ion and water which neutralized the acidic solution and were obtained with said neutralization processor 2. Since this concentration column 3 is incorporated, even if the metal ion in an acidic solution is a minute amount, for example, metal ion concentration can

be condensed even to the concentration which can be analyzed by neutralization processing liquid after carrying out neutralization processing of the acidic solution circulating the inside of this concentration column 3 between predetermined time.
[0041] The path change means 4 sends into said concentration column 3 the path and eluate which send into the 2nd space section 9 in said neutralization processor 2 the effluent liquor discharged from said concentration column 3. Although the structure does not necessarily have a limit especially as long as it has formed so that an eluate can be changed to the path sent into the separation column 6 with the metal ion in the concentration column 3 In this example, it has two sets of change bulbs, i.e., 1st change bubble 4a, and 2nd change bulb 4b. This 1st change bulb 4a and 2nd change bulb 4b The path in which the neutralization processing liquid which transported the neutralization processing liquid by which neutralization processing was carried out with the neutralization processor 2 to the concentration column 3, and passed the concentration column 3 by the change actuation is introduced into the liquid inlet in the neutralization processor 2, An eluate is poured into the concentration column 3 and it has the structure which can change the eluate of the metal ion content discharged from the concentration column 3 to the path transported to the guard column 5.
[0042] In addition, a liquid transport appearance pump is shown by 10 in drawing 5 , eluate transportation Rhine to which an eluate is conveyed is shown by 11, acidic solution transportation Rhine to which an acidic solution is conveyed is shown by 12, coloring liquid transportation Rhine to which coloring liquid is conveyed is shown by 13, and effluent transportation Rhine to which an effluent is conveyed is shown by 14.
[0043] Said ion chromatograph equipment operates as follows.
[0044] In addition, water shall be filled in the 2nd space section 9 in the neutralization processor 2. The path change means 4 is operated and a liquid inlet [ in / for other end opening of tubed case 2b and end opening of the concentration column 3 in the neutralization processor 2 / other end opening of this concentration column 3 and the neutralization processor 2 ] is changed into a free passage condition into a free passage condition. If it changes to such a path with the path change means 4, eluate transportation Rhine 11 which introduces an eluate, and the liquid inlet port in the guard column 5 are in the free passage condition. Then, when a predetermined electrical potential difference is impressed to the anode plate and cathode in the neutralization processor 2 and a current is energized, electrolysis arises with said anode plate and cathode within the 2nd space section 9, and it is OH in liquid. - Concentration increases. This OH - Anion exchange membrane is penetrated and it results in the interior 8 of tube-like object 2a, i.e., the 1st space section. Within the 1st space section 8, it is the proton and OH in an acidic solution. - It reacts, and becomes water and the neutralization processing liquid containing the metal ion contained in the acidic solution and water is transported to the concentration column 3 from the neutralization processor 2. In the concentration column 3, the trap of the metal ion in neutralization processing liquid is carried out. Since water exists in the liquid which was returned in the 2nd space section 9 from the liquid inlet in the neutralization processor 2, and was discharged from the concentration column 3, the water is electrolyzed by an anode plate and cathode, and the liquid discharged from the concentration column 3 is OH. - It is made to generate. This generated OH - It reacts with the proton in the acidic solution which penetrates anion exchange membrane and exists in the 1st space section 8.
[0045] OH generated by electrolysis in the 2nd space section 9 in this condition - Anion exchange membrane is penetrated, and it results in the 1st space section 8, and is the proton and OH in an acidic solution within the 1st space section 8. - It reacts, and becomes water and that water repeats circulation of returning from the 1st space section 8 in the 2nd space section 9 again via the concentration column 3.
[0046] After repeating circulation of the predetermined time above, the path change means 4 is operated and a path is changed. That is, an eluate is introduced in the concentration column 3 and introduces into the guard column 5 and the separation column 6 with an eluate the metal ion by which the trap was carried out within the concentration column 3. It is mixed with coloring liquid, the liquid containing the ion kind separated in the separation column 6 is introduced into a detector, and identification of an ion kind is performed.
[0047] The following examples are given as a sample which can be analyzed with the ion chromatographic-analysis method and ion chromatographic-analysis equipment of this invention.
[0048] 1. When analyzing transition metals, such as the liquid Fe, nickel, and Co in a boiler, if Fe, nickel, Co, etc. as an insoluble element in liquid remain as it is, ion chromatographic analysis is impossible. If an insoluble element is dissolved by HCl and the approach of this invention is used, quantitative analysis of a metal cation will be carried out easily and correctly.
[0049] 2. The factory drainage insoluble matter containing insoluble matter is a metallic oxide in many cases, and if it can dissolve from an acid, quantitative analysis will be altogether possible by the approach of this invention.
[0050] 3. Waste plating liquid 4. of plating works The following technical effectiveness is done so by these example equipments, such as inspection of the pure water used by semi-conductor relation.
[0051] (1) The ion chromatographic-analysis method and chromatograph equipment which can analyze a metal with high degree of accuracy can be offered.
[0052] (2) Since the acidic solution was always neutralized in the state of circulation, it became unnecessary about between helps.

[0053] (3) If an alkali solution and an acidic solution are circulated, reproductive batch processing becomes unnecessary, continuous analysis will be possible and maintenance will also become easy.
[0054] (4) Since it is neutralized by migration of only ion, the sample solution is not diluted but analysis of a low-concentration sample is attained.
[0055] (5) Since preparation of the alkali solution needed for neutralization completely becomes unnecessary, the time and effort of alkali solution preparation is canceled, and the risk at the time of alkali solution preparation disappears.
[0056] (6) Since the concentration column is incorporated, this metal ion can be condensed and analysis of the sample which contains a low-concentration metal also by this is attained.
[0057] (7) Since it has the path change means, a passage change can be made easily and it becomes good ion chromatograph equipment of operability.

[0058]
[Effect of the Invention] According to this invention, it is OH required for neutralization of an acidic solution. - Since it forms by electrolysis, the activity which dissolves alkali matter like before and prepares an alkali solution completely becomes unnecessary, and the risk on the activity which accompanies such a preparation activity is also canceled. Moreover, OH required for neutralization of an acidic solution - Concentration is OH required only by performing adjustment of the potential impressed to an anode plate and cathode, and the amount of currents, since it is easily calculable from the electrochemical theory therefore. - The liquid which has concentration can be prepared easily. Moreover, it is cancelable all un-arranging in the neutralization processing or ion chromatographic analysis by the inaccuracy thru/or the error of alkali matter weighing capacity like [ at the time of dissolving the alkali matter and preparing an alkali solution ].

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]
[Drawing 1] Drawing 1 is the explanatory view of the mechanism of the neutralization device in which anion exchange membrane is used.
[Drawing 2] Drawing 2 is the explanatory view showing neutralization by flat film-like anion exchange membrane.
[Drawing 3] Drawing 3 is the explanatory view showing the neutralization processor loaded with the bundle of the hollow filament made from anion exchange membrane.
[Drawing 4] For Fig. 4, drawing 4 is the explanatory view showing neutralizing by holding an acidic solution in the container formed by anion exchange membrane.
[Drawing 5] Drawing 5 is the approximate account Fig. showing one example of the ion chromatograph equipment of this invention.
[Description of Notations]
I [ ... A container wall, P / ... A tube wall, 1 / ... Ion chromatograph equipment, 2 / ... A neutralization processor, 3 / ... A concentration column, path 4 / ... A path change means, 5 / ... Guard columns 5 and 6 / ... A separation column, 7 / ... Detector ] ... Anion exchange membrane, S ... An acidic solution, E ... An alkali solution, W

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[Translation done.]

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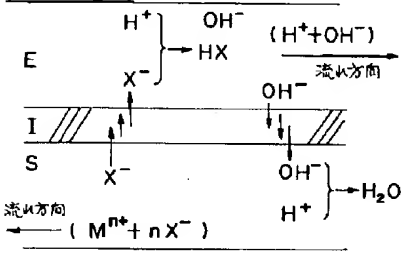
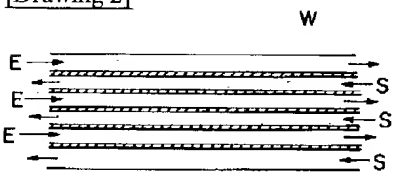
DRAWINGS

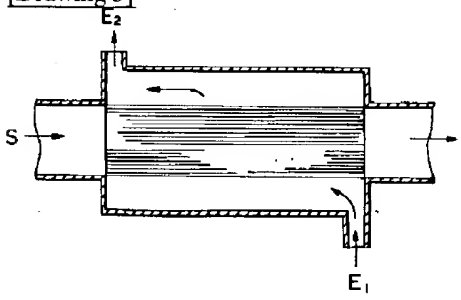
[Drawing 1]



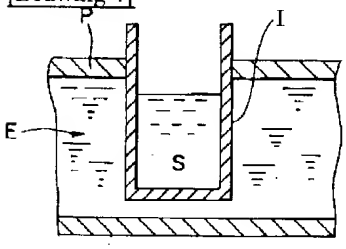

[Drawing 2]



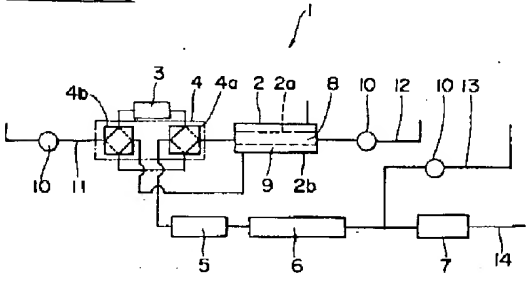

[Drawing 3]




[Drawing 4]




[Drawing 5]



* NOTICES *



CLAIMS

[Claim(s)]
[Claim 1] OH generated by electrolysis - Neutralization art characterized by separating anion exchange membrane and neutralizing an acidic solution.
[Claim 2] The ion chromatographic-analysis method characterized by pretreating an acidic solution by said neutralization art according to claim 1.
[Claim 3] The 1st space section which has an acidic solution, and OH - OH generated in the 2nd space section which comes to have the anode plate and cathode which are generated by electrolysis, and the acidic solution of the 1st space section and the 2nd space section - Neutralization processor characterized by coming to have the anion exchange membrane which can be counteracted.
[Claim 4] The neutralization processor characterized by coming to have ultrasonic irradiation equipment which irradiates a supersonic wave towards the anode plate and cathode of said 2nd space section.
[Claim 5] Ion chromatograph equipment characterized by coming to have said neutralization processor according to claim 3 or 4.
[Claim 6] Said neutralization processor according to claim 3 or 4 and the concentration column which condenses the metal ion in the processing liquid which neutralization processing was carried out and was obtained with this neutralization processor, The path and eluate which send into the 2nd space section in said neutralization processor the effluent liquor discharged from said concentration column are sent into said concentration column. Ion chromatography FURAFU equipment which carries out the description bet of coming to have the path change means which changes an eluate to the path sent into an ion chromatographic column with the metal ion in a concentration column.

[Translation done.]